



# Successful removal of an aspirated broken metal tracheostomy tube from the right main bronchus: a case report

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**Introduction and importance:** Tracheostomy has been done since ancient Greece, but in today's modern format, it has been accepted for over one and a half centuries. Improvements in medical care and treatments have survived disabled patients who died in the past decades. Among these, tracheostomy tube (TT) segment aspiration was as rare as less than 100 cases have already been documented. We reported a case of aspirated metal TT to the right main bronchus from a 12-year-old teenage girl and then reviewed the available literature.

**Case presentation:** The patient suffered from subglottic stenosis affected after adenotonsillectomy remained for 6 years. She was referred to the emergency department for acute respiratory distress and cyanosis. Immediately underwent rigid bronchoscopy, and on the way to the operating room, she was oxygenated from the tracheal orifice. The detached part was successfully removed.

**Clinical discussion:** The common tracheostomy indications in children involve congenital or acquired airway stenosis, some conditions needing long-term ventilation, bilateral vocal fold insufficiency, and infectious compromise of the upper airway. Metal TTs for long-lasting are preferred to synthetic ones. Nevertheless, it has some potential complications.

**Conclusion:** Careful inspecting, especially metallic TTs, after every disinfection and regular follow-up by the surgeon, is highly recommended to prevent potential casualties.

**Keywords:** aspiration, rigid bronchoscopy, subglottic stenosis, tracheostomy tube

## Introduction

Tracheostomy, a surgical opening of a way out of the trachea and inserting a tube, is one of the oldest known surgical procedures. Although not in today's form, ancient Greek people did this procedure. However, since the mid-1800s, with the invention of Armand Trousseau, a French physician, routine tracheostomy procedures have spread worldwide<sup>[1]</sup>. In this era, developments in surviving premature neonates and the pediatric population suffering from congenital malformations have naturally increased tracheostomies. Even though life-saving, it usually accompanies by various complications. Fractures then getting stuck in a part of the tracheostomy tube (TT) in the tracheobronchial tree is a rare entity that has already been reported in less than 100 cases since 1960. For an airway emergency, it is necessary to manage the patient as soon as possible with an otorhinolaryngologist or a

## HIGHLIGHTS

- Tracheostomy is one of the oldest known surgical procedures.
- Advances in medical care in the new era have increased who needs breathing aid devices like a tracheostomy.
- Tracheostomy tube segments aspiration is so rare that less than 100 cases have already been reported.
- The patient and his/her medical care providers should be attentive to metallic tracheostomy tube maintenance.

thoracic surgeon. Anyhow, dealing with any foreign body in the laryngotracheobronchial tree has remained challenging. Rigid bronchoscopy is typically the standard management for foreign body aspiration. Before the introduction of bronchoscopy, it had high mortality and morbidity. Although persisting, with the advent of bronchoscopy, this has reduced drastically<sup>[2]</sup>. We have reported a case of aspirated broken metal TT into the right main bronchus in a 12-year-old girl that was successfully removed by rigid bronchoscopy. Then, we reviewed all the available literature for the previous 61 years as much as possible. This work has been reported in line with the Surgical Case Report (SCARE) criteria<sup>[3]</sup>.

## Presentation of the case

A 12-year-old tracheostomized thin girl with acute onset dyspnea and stridor without cyanosis was presented to the emergency department. Her respiration was quick and deep, with a rate of 30 per minute and subcostal retractions. At the time of removal,

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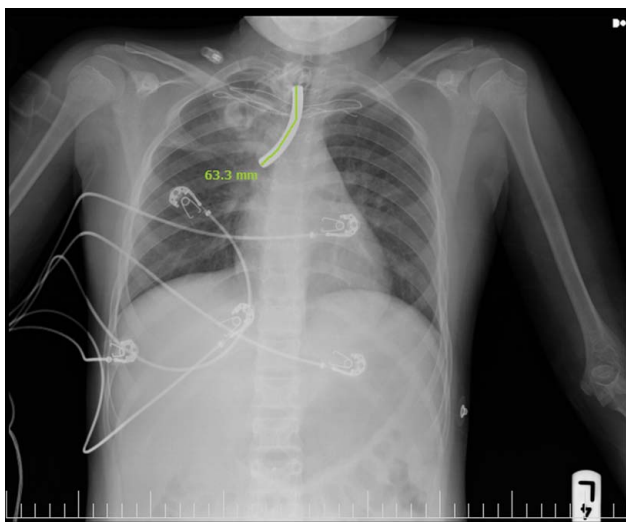
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cleaning, disinfecting and putting in place of the metal TT, a part was broken and aspirated. The respiratory symptoms were initiated in her 6th year of life when she for constant coughing, adenotonsillar hyperplasia with obstructive sleep apnea refers to bilateral tonsillectomy. During surgery for subglottic stenosis, the child underwent tracheostomy since several graded beguinage attempts had failed. It lasted for 18 days, but intolerance and respiratory problems occurred again. Numerous attempts to fix the stenosis had failed until the decision was made to have a permanent TT. The patient has had systemic sclerosis since her 6th year old too. She lived with her permanent metal TT, which was cleaned, disinfected, and put in place every day until the accident occurred. Her 7-year-old sister respire through a TT because of subglottic stenosis. The patient immediately underwent oxygenation through her orifice at the level of the trachea and was then transferred to the operating room. A portable anteroposterior X-ray revealed that the inner curve part of the TT had been stuck into the right main bronchus (Fig. 1). After deep sedation by rigid bronchoscopy through the tracheostomy, the thoracic surgeon successfully removed the broken segment from the right bronchus (Fig. 2). The balloon catheter technique was not used for three reasons: (1) for this, we needed bronchoscopy first to localize the foreign body while bronchoscopy has two diagnostic and therapeutic roles; (2) bronchoscopy is a more accessible modality; and (3) in the cases of bronchoscopic procedure failure, the balloon catheter technique find indication.

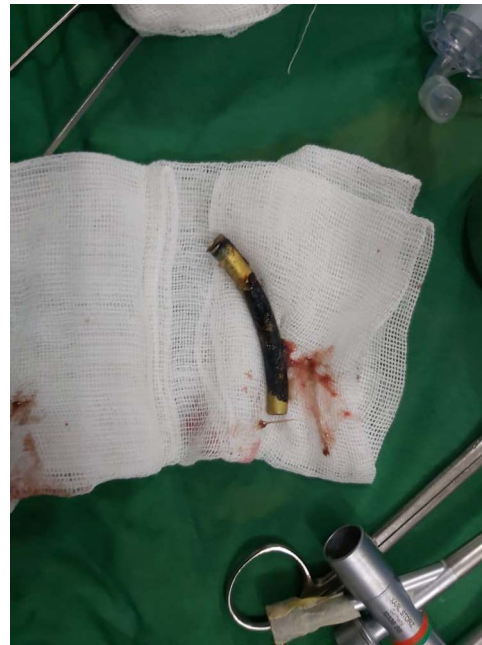
The recovery and follow-up periods were uneventful.

**Discussion**

Tracheostomy operation is as common as more than 110 000 are done annually in the United States<sup>[4]</sup>. This procedure was known from the era of ancient Greece when Asclepiades first described it in 100 BC. Its use flourished in the mid-19th century by Armand Trousseau in treating diphtheria-associated dyspnea<sup>[5]</sup>. Although there is no diphtheria today, advances in medicine have survived many care-dependent patients who died in the past.



**Figure 1.** The digital portable anteroposterior chest X-ray revealing the metallic separated part with an approximate length of 63 mm.



**Figure 2.** The foreign body is perfectly removed.

Common tracheostomy indications in children include airway stenosis, whether congenital or acquired, neurologic conditions requiring long-term ventilation or pulmonary toilet, bilateral vocal fold insufficiency, and infectious compromise of the upper airway<sup>[6]</sup>. In 40–50% of cases, complications occur. However, most tracheostomy-related complications are minor; 1% will suffer a catastrophic event, and of those, up to half will die<sup>[7]</sup>. Its complications are divided into three intraoperative, early, and late postoperative categories. Most intraoperative complications are hemorrhage, air embolism, and damage to the trachea. However, the most common postoperative complications in childhood are granuloma formation, infection, obstruction of the cannula, accidental decannulation, and post-decannulation trachea cutaneous fistula, respectively<sup>[8]</sup>. Nearly a quarter of tracheostomized patients will require hospital admission within a month of their tracheostomy placement<sup>[9]</sup>. More than 90% of severe tracheostomy complications occur more than 1 week after placement<sup>[10]</sup>.

Reviewing the literature entitled ‘tracheostomy complications’, we encountered the abovementioned complications. Aspiration of broken parts of TTs to the tracheobronchial tree as a complication was as rare as we were only able to collect and summarize 78 cases since 1960 (Table 1). However, many cases had not been declared the primary indication for tracheostomy; most were related to tracheolaryngeal stenosis due to prolonged intubation and ventilator dependency<sup>[11–26]</sup>.

Since the metal tubes are rigid and have a lower risk of getting fractured, they are more favored for prolonged use. Factors predisposing such tubes to be broken: (1) wear and tear for a long time causing ageing or reinsertion of a tube, (2) frequent sterilizing through boiling, using sodium bicarbonate, or sodium hypochlorite solutions, (3) tissue reactions and granulation formation between the fangs of the Fuller’s tube leading to loosening and constant continued pressure, (4), follow-up deficiency, and alkaline pH of respiratory secretions and moisture which by

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**Table 1**

**A summary of the previous works already reported in the medical literature, classified by the authors' names, year of publication, demographic information of the patients, the material used in tubes' structures, the underlying disorder that necessitated tracheostomy, the initial signs and symptoms the patients had, the stuck place in the tracheobronchial tree, the place of fracture, and the final outcome of them.**

Authors	Year	Age and sex	Type of tube	Indication	Presentation	Stuck place	Site of fracture	Outcome
1. Bassoe et al. <sup>[33]</sup>	1960	35	Silver/nickel	Poliomyelitis	ND	ND	Distal end of cannula	ND
2. Kakar et al. <sup>[34]</sup>	1972	40	Copper/zinc	Scleroma of laryngopharynx	ND	ND	Neck plate	ND
3. Kemper et al. <sup>[49]</sup>	1972	48/M	Metal	ND	ND	Trachea and right main bronchus	Inner tracheostomy tube	ND
4. Sood et al. <sup>[50]</sup>	1973	60	Plastic	Laryngeal cancer	Respiratory distress	ND	Neck plate	ND
5. Maru et al. <sup>[35]</sup>	1978	50	Copper/zinc	Bilateral vocal cord paralysis	Respiratory distress	ND	Neck plate	ND
6. Okafor et al. <sup>[36]</sup>	1983	40	Silver/zinc	Neck trauma	Respiratory distress	ND	Neck plate	ND
7. Bhalia <sup>[51]</sup>	1983	50/F	ND	ND	ND	Left main bronchus	Outer tube	ND
8. Otto R et al. <sup>[37]</sup>	1985	3/M	Metal	Bilateral vocal cord paralysis for Hyaline membrane disease	Respiratory distress	Right main stem bronchus	Shaft	Successful removal by rigid bronchoscopy
9. Bowdler et al. <sup>[11]</sup>	1985	3	Silver	Subglottic stenosis	ND	ND	Neck plate	ND
10. Bowdler et al. <sup>[11]</sup>	1985	76	Silver	Bilateral vocal cord paralysis	ND	ND	Neck plate	ND
11. Kohli et al. <sup>[12]</sup>	1987	40	Metal	Bilateral vocal cord paralysis	ND	ND	Neck plate	ND
12. Kohli et al. <sup>[12]</sup>	1987	30	Polyvinyl chloride	Laryngeal stenosis	ND	ND	Unknown	ND
13. Kohli et al. <sup>[12]</sup>	1987	55	Polyvinyl chloride	Laryngeal cancer	ND	ND	Unknown	ND
14. Kohli et al. <sup>[12]</sup>	1987	65	Polyvinyl chloride	Laryngopharyngeal cancer	ND	ND	Unknown	ND
15. Kohli et al. <sup>[12]</sup>	1987	68	Polyvinyl chloride	Laryngeal cancer	ND	ND	Unknown	ND
16. Kohli et al. <sup>[12]</sup>	1987	69	Polyvinyl chloride	Laryngopharyngeal cancer	ND	ND	Unknown	ND
17. Kohli et al. <sup>[12]</sup>	1987	32	Polyvinyl chloride	Laryngeal trauma	ND	ND	Unknown	ND
18. Sullivan et al. <sup>[13]</sup>	1987	4	Silicone rubber	Ventilator dependence	Respiratory distress	ND	Neckplate	ND
19. Majid et al. <sup>[38]</sup>	1989	63	Silver	Bilateral vocal cord paralysis	ND	ND	Neck plate	ND
20. MING C. C. et al. <sup>[14]</sup>	1989	50/M	silver Jackson tracheostomy tube, size 28	Supraglottic and tracheal stenosis due to prolonged intubation post-pericardiectomy	Discomfort over the right side of his chest after violent coughing	Right main bronchus	Stem	Successful removal by rigid bronchoscopy
21. A. R. NICOLAIDES <sup>[39]</sup>	1990	73/M	Silver	Total laryngectomy 14 years previously	Respiratory distress	Right main bronchus	Obturator	Successful removal by rigid bronchoscopy
22. P. J. BROCKHURST <sup>[40]</sup>	1991	16m/F	Silver Holinger tracheostomy tube	ND	ND	ND	ND	Death of the infant
23. Bhatia et al. <sup>[52]</sup>	1992	58	Polyvinyl chloride	ND	Respiratory distress	ND	Neck plate	ND
24. Bhatia et al. <sup>[52]</sup>	1992	63	Polyvinyl chloride	ND	None	ND	Neck plate	ND
25. Bhatia et al. <sup>[52]</sup>	1992	68	Polyvinyl chloride	Laryngopharyngeal cancer	Respiratory distress	ND	Neck plate	ND
26. AJAZ ALVI et al. <sup>[32]</sup>	1994	47/M	no. 8 fenestrated Shiley tracheostomy tube with a nonfunctional cuff.	Morbidly obese and tracheotomized for obstructive sleep apnea	A foul smell from the tracheostomy tube and a mass under his tube.	Trachea	Stem	Successful removal
27. GUPTA S.C. et al. <sup>[53]</sup>	1996	10/M	Fuller's biflanged metallic tracheostomy tube	Laryngeal diphtheria. At the age of six, one flange of the outer tracheostomy tube fractured and lodged in the left main bronchus	ND	Right main bronchus	Two parts of flanges	Removal from right bronchus under general anesthesia. The older one was left in the distal part of left bronchus.
28. Nayak D. R. et al. <sup>[41]</sup>	1999	70/M	Fuller's tracheostomy tube	Stroke with left vocal cord paralysis	Hemoptysis, fever, and chest pain	Bilateral primary bronchi	Two parts of flanges	Success in the first and failure in the second time
29. Polycarp N. Gana et al. <sup>[54]</sup>	1999	7/M	Polyvinyl chloride	Recurrent respiratory papillomatosis	Mysterious disappearance of the shafts of the tracheostomy	Right and left main bronchi	Two parts in the shaft	Successful removal by rigid bronchoscopy
30. Kreml et al. <sup>[34]</sup>	1999	48/M	ND	ND	ND	Trachea and right main bronchus	Fenestra	ND
31. V. K. Poorey. <sup>[44]</sup>	2000	28/M	Fullers	Fullers	Sudden onset of cough	Left main bronchus	From the flange	Successful removal by rigid bronchoscopy
32. Srirompotong et al. <sup>[55]</sup>	2001	7/M	ND	ND	ND	Left main bronchus	Inner tracheostomy tube	ND
33. Daniel K. Ng et al. <sup>[15]</sup>	2002	3/M	Portex blue line tracheostomy tubes (Kent,UK)	Spinal muscular atrophy type I.	Sudden decrease in O <sub>2</sub> saturation	Left main bronchus	Broken at the connection between the tube and the neck plate	Successful removal by rigid bronchoscopy
34. José C Fraga et al. <sup>[16]</sup>	2003	6/F	PVC tracheostomy tube (Portex ®)	Central Alveolar Hypoventilation Syndrome idiopathic	ND	Distal trachea	At the junction with the horizontal plate	Successful removal by rigid bronchoscopy
35. A. M. Shivakumar et al. <sup>[31]</sup>	2003	20/M	Fuller's tube	Bilateral abductor paralysis of the vocal cords	Mild respiratory distress	Above the carina	Inner tube	Jackson's tracheostomy tube was inserted.
36. Iwao Takanami et al. <sup>[17]</sup>	2007	70/M	silicone T-tube	Respiratory failure due to Pancreaticoduodenectomy for an intraductal papillary neoplasm of the pancreas and a rectal carcinoma	Vomiting a piece of the broken T-tube and coughing	ND	At the junction of the proximal portion of the vertical and horizontal limbs	Successful removal by rigid bronchoscopy
37. Wu et al. <sup>[56]</sup>	2007	14m/F	PVC	ND	ND	Trachea and left main bronchus	ND	ND
38. S Shashinder et al. <sup>[57]</sup>	2008	Three cases	Synthetic, non-metallic type	ND	Alarm on the ventilator indicating a hypoxic event	ND	Fractured from the neck plate of the tube	Successful removal by rigid bronchoscopy
39. Radpay et al. <sup>[43]</sup>	2009	41/M	Metal	ND	ND	Trachea and left main bronchus	Shaft	ND
40. Patom Pironchai et al. <sup>[18]</sup>	2010	14	No. 5 stainless steel tracheostomy tube	Prolonged intubation after a burr-hole craniotomy for subdural hematoma evacuation	Cough with hyperpnea	Right main bronchus	At the junction between the inner tube and connector	Successful removal by rigid bronchoscopy
41. Irfan Iqbal et al. <sup>[19]</sup>	2011	10/F	Metallic tracheostomy tube	Sub-glottic stenosis	noticing that her tube was not present at the tracheostomy site without distress	Left main bronchus	Detachment from the flanges of tracheostomy tube	Successful removal by rigid bronchoscopy
42. Anvind Krishnamurthy et al. <sup>[44]</sup>	2011	60/M	Metallic	Total laryngectomy with adjuvant radiotherapy for carcinoma larynx	Occasional cough with labored breathing	Lodged partly in the trachea and partly along the left main bronchus	A fracture at the junction between the inner tube and neck plate.	Successful removal by rigid bronchoscopy
43. Zareen Aliana Lynrah et al. <sup>[20]</sup>	2012	7/M	Angeltouch PVC uncuffed tube	Meningitis and prolonged intubation	Severe cough, severe tachypnoea and tachycardia	Right main bronchus	From the flange at the junction	Successful removal, aspiration pneumonia then recovery
44. Zareen Aliana Lynrah et al. <sup>[20]</sup>	2012	8/F	Number 6 mm ID Angeltouch1 tracheostomy tube	ND	Sudden severe stridor, severely desaturating (SpO <sub>2</sub> < 25%)	ND	ND	Succumbed to death
45. Zareen Aliana Lynrah et al. <sup>[20]</sup>	2012	5	Number 4 mm ID Angeltouch1 PVC tracheostomy	ND	Severe pain and respiratory distress with severe cyanosis	ND	Endotracheal part had been separated from the flange	Successful removal and Montgomery T-tube placement.

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**Table 1**  
**(Continued)**

Authors	Year	Age and sex	Type of tube	Indication	Presentation	Stuck place	Site of fracture	Outcome
46. Prajigna Kumar Parida <sup>(26)</sup>	2014	1/M	Romson tube (PVC)	Retropharyngeal abscess with bilateral abductor VC paralysis	ND	Trachea just below the stoma	Junction between tube and neck plate	Local wound exploration and removal under direct vision
47. Prajigna Kumar Parida <sup>(26)</sup>	2014	6/F	Jackson tube, copper, zinc, nickel	Subglottic stenosis secondary to prolonged intubation	ND	Trachea and left main bronchus	Junction between inner tube and neck plate	Successful removal by rigid bronchoscopy
48. Prajigna Kumar Parida <sup>(26)</sup>	2014	7/F	Romson tube (PVC)	Subglottic stenosis secondary to prolonged intubation	ND	Right main bronchus	Junction between tube and neck plate	Successful removal by rigid bronchoscopy
49. Prajigna Kumar Parida <sup>(26)</sup>	2014	8/M	Jackson tube, copper, zinc, nickel	Congenital subglottic hemangioma	ND	Right main bronchus	Junction between inner tube and neck plate	Successful removal by rigid bronchoscopy
50. Prajigna Kumar Parida <sup>(26)</sup>	2014	9/M	Jackson tube, copper, zinc, nickel	Bilateral abductor palsy	ND	Right main bronchus	Junction between tube and neck plate	Successful removal by rigid bronchoscopy
51. Prajigna Kumar Parida <sup>(26)</sup>	2014	11/F	Romson tube (PVC)	Bilateral abductor paralysis	ND	Trachea below the stoma	Junction between tube and neck plate	Successful removal by rigid bronchoscopy
52. Prajigna Kumar Parida <sup>(26)</sup>	2014	13/F	Jackson tube, copper, zinc, nickel	Bilateral abductor paralysis	ND	Right main bronchus	Junction between inner tube and neck plate	Successful removal by rigid bronchoscopy
53. Prajigna Kumar Parida <sup>(26)</sup>	2014	15/F	Fuller tube, copper and Zinc	Post OP poisoning besides subglottic stenosis	ND	Right main bronchus	Junction between tube and neck plate	Successful removal by rigid bronchoscopy
54. Hashem M. Al-Momani et al. <sup>(23)</sup>	2015	4/F	ND	Recurrent pneumonia and prolonged intubation for Leigh's disease, developmental delay, hypotonia, and delayed walking	Coughing, cyanosis and oxygen desaturation	Left main bronchus	From its base	Successful removal by rigid bronchoscopy
55. Dra. Giselle Cuestas et al. <sup>(34)</sup>	2015	18m	Metal	Craniofacial malformation due to Apert syndrome	Cardiorespiratory arrest	Trachea and right main bronchus	Junction of the neck plate with the tubular	Successful removal by rigid bronchoscopy
56. Apichart So-ngern et al. <sup>(46)</sup>	2016	65/M	Metal	Bed-bound from hemorrhagic stroke	Fever and cough with purulent sputum	Left main bronchus	From its proximal part	Successful removal by rigid bronchoscopy
57. Sumani Lata Gupta et al. <sup>(22)</sup>	2016	6/M	3.5 Pontex tracheostomy tube	Subglottic stenosis due to prolonged intubation for lung abscess, and thoracic vertebral TB	Cyanosis and seizure, SpO2 = 45%	Right main bronchus	From its base	Successful removal by rigid bronchoscopy
58. Syed Mezar Hashemi et al. <sup>(36)</sup>	2017	57/M	PVC	Laryngeal cancer from 15 years previously	Respiratory distress	Carina	From its base	Successful removal by fiberoptic bronchoscopy
59. Ambasta S et al. <sup>(24)</sup>	2018	48/M	32 size Fuller's tube	Tracheal stenosis due to difficult intubation.	Breathing difficulty	Right main bronchus	At the junction of flanges and the collar of the tube	Successful removal by rigid bronchoscopy
60. Kashoob M et al. <sup>(47)</sup>	2018	29/M	Jackson's metallic double-lumen tube	Leukodystrophy and kyphosis	High grade fever, respiratory distress, and an altered level of consciousness	Right main bronchus	Flange	Successful removal by rigid bronchoscopy
61. Vaishnavi BD et al. <sup>(29)</sup>	2019	50/M	6.5-mm cuffed tube	Prolonged mechanical ventilation due to failure to wean	Dyspnea, Cough and bleeding at the tracheostomy site	Trachea	At the junction of flange	Successful removal by rigid bronchoscopy
62. Li-Jun Bo et al. <sup>(48)</sup>	2019	77	Metal	Surgical repair of broken ribs	ND	Left main bronchus	End of the metal tracheostomy tube	Surgical removal by rigid bronchoscopy
63. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	1/M	Romson's tube (PVC)	Retropharyngeal abscess with bilateral abductor VC paralysis	ND	Trachea just below the stoma	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
64. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	6/F	Jackson's tube (copper, zinc, nickel)	Subglottic stenosis secondary to prolonged intubation	ND	Trachea and Left main bronchus	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
65. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	7/F	Romson's tube (PVC)	Subglottic stenosis secondary to prolonged intubation	ND	Right main bronchus	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
66. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	8/M	Jackson's tube (copper, zinc, nickel)	Congenital subglottic hemangioma	ND	Right main bronchus	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
67. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	9/M	Jackson's tube (copper, zinc, nickel)	Bilateral abductor palsy	ND	Right main bronchus	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
68. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	11/F	Romson's tube (PVC)	Bilateral abductor paralysis	ND	Trachea below the stoma	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
69. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	13/F	Jackson's tube (copper, zinc, nickel)	Bilateral abductor paralysis	ND	Right main bronchus	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
70. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	15/F	Fuller's tube (copper and Zinc)	Post OP poisoning with subglottic stenosis	ND	Right main bronchus	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
71. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	6/M	Romson's tube (PVC)	Subglottic stenosis secondary to prolonged intubation for retropharyngeal abscess	ND	Trachea below the stoma	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
72. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	14/M	Jackson's tube (copper, zinc, nickel)	Prolonged intubation for meningococcal meningitis	ND	Carina	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
73. Prajigna-Kumar Parida et al. <sup>(21)</sup>	2020	12/F	Fuller's tube (copper and Zinc)	Bilateral abductor palsy	ND	Right main bronchus	Junction between inner tube and neck plate	Surgical removal by rigid bronchoscopy
74. Bharat Hosur <sup>(59)</sup>	2020	35/M	ND	ND	Dyspnea	Carina and Left main bronchus	Just distal to the junction of two flanges	Successful removal
75. Our case	2021	12/F	Metal	Surgical stenosis	Respiratory distress	Right main bronchus	Neck plate	Successful removal

stagnating over the tube and chemical reaction with zinc and copper elements, leads to erosions over the tube. This process is called season cracking<sup>[27–31]</sup>. Typically, the evidence mentioned above has been derived from studies on the pediatric population. Outer flanges are the most disposed of part to be broken<sup>[31]</sup>. The most vulnerable tubes to be fracture are alloys of copper, zinc, nickel, or silver. These metallic elements have poor corrosion resistance<sup>[32]</sup>. Among the summarized cases above, we found 39 out of 77 accident reports with specifically metallic TTs<sup>[11,12,14,18,19,21,22,24,26,31,33–48]</sup>.

## Conclusion

The best way to prevent complications and accidents related to a metal tracheal tube is first to instruct the patient and his or her family on proper home tube cleaning and then adequately warn them regarding the importance of follow-up. However, the surgeon knows when the time for the tube replacement is. The tube and neck plate junction is the most vulnerable fracture site in metal TTs. We also need to be more aware of aspirated broken metal TTs from the right main bronchus and that more studies are needed to understand the advantages and limitations.

## Ethical approval

This issue has been raised and approved by the ethics committee of Ardabil University of Medical Sciences, Iran.

## Consent

The consent in which the patient has allowed to use medical records and therapeutic information is attached to the medical document. The authors testify the patient privacy maintenance. On request, a copy of the written consent is available for review by the Editor-in-Chief of this Journal. The authors ensure that all the images/figures/photos are suitably anonymized with no patient information or means of identifying the patient.

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## Author contribution

M.V.O.: the thoracic surgeon who has visited the patient and taken conservative management, also proposed manuscript writing and the role of supervision; A.S.K.: a member of the research committee of the hospital, prepared the manuscript, decided to advance it to a ‘case report and literature review’ manuscript, and then pursues the submission process.

## Conflicts of interest disclosure

The authors declare that there are no conflicts of interest.

## Research registration unique identifying number (UIN)

Since this case report does not contain any new surgical technique or equipment, it has no Research Registry UIN.

## Guarantor

Ali Samady Khanghah accepts full responsibility for the work and approves the whole process, from designing the study to publishing.

## Provenance and peer review

Not commissioned, externally peer-reviewed.

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